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The articles to be appeared in the Bulletin must be concise, supplied with experimental methods and data and understandable, without specially referring to the Japaneses texts. It ought, however, not exceed four printed pages as a rule. Any longer articles may be accepted according to the decision of the Council, with or without charge for exceeding pages.

Journal of the Agr. Chem. Soc. of Japan will be published in Japanese as formerly. Those desiring the detailed information of the articles appeared in the Bulletin may look for in the Journal of the same Number or the same Volume.

Editor : Umetarō SUZUKI.
Associate Editors : Kakuji GOTŌ and Yoshihiko MATSUYAMA.

ON THE ENZYMIC ACTIONS OF MALT DIASTASE, PURIFIED FRACTIONALLY BY ETHYL ALCOHOL, UPON POTATO STARCH AND ITS SOLUBLE STARCH.

By Fumiwo Hemmi and Mitsuji Ito.

(Received March. 29th., 1926)

In our previous paper (this Journal, Vol. 1, No. 8), we have reported that the enzymic actions of malt diastase upon potato starch and its soluble starch are different from those upon the other kinds of starch and soluble starch. Since then, we have carried out a further investigation to make the fact more clearly and obtained the following results:

1. Malt diastase saccharifies potato starch more easily than its soluble starch prepared by us according to the Lintner's method.

2. The viscosity of potato starch paste is relatively large, but malt diastase liquefies the paste completely within a short time.

3. For the purification of malt diastase, we extacted malt powder by 20% alcohol (vol.). To the extract, strong alcohol was added making it altogether 55% in volume. The fraction precipitated from 55% alcoholic solution was removed. Then the alcoholic content of the filtrate was increased to 80% by a further addition of strong alcohol. The precipitate of the enzyme thus obtained, and purified again by the repetition of the same process, displayed strong actions of both liquefaction and saccharification upon potato starch paste.

4. Of the fractions of malt diastase purified fractionally by ethyl alcohol, the most active fraction for liquefaction does not coincide with that for saccharification.

(Feb. 28th., 1926.)

RECOVERY AND UTILIZATION OF OLD SLLK DEGUMMING BATHS

By Risaku Tsunokae.

(Received Apr.9th., 1926)

I. In spite of the long history of boiling-off of the silk, it was only towards the last decade of the past century that man felt it mas necessary to recover and reutilize the old silk degumming baths. The much increase in the price of soap, and the difficulty of conducting the boiling-off operation at a sufficiently low cost to compensate for the higher cost of labour, invited man to this consideration.

II. Boiled-off liquor is now employed in the dyeing of silk, as it is found to have good levelling or equalizing properties, by causing the coloring matter to go more slowly on the fibre.

III. The composition of the boiled-off liquor is much liable to variation as the silk scourers differ from one another in the quantity of soap to be used in the treatment of raw silk. The constituents of value in the liquor are, however, no other than the fatty matter and the sericine or silk gum, in every case.

IV. A sample of boiled-off liquor, examined by the author, sho weda specific gravity of 1.010, and contained:

Soap	1.119%
Free fatty acids	0.143
Sericine	0.316

V. Some reagents such as sulphate of alumina, sulphate of copper, lead acetate and chloride of calcium, precipitate both the soap and silk gum as curdy mass. This can be separated through filtration from the quite clear waterly liquid which is in a good condition for running off. The mass of lead soap and sericine thus obtained contains the largest quantity of the silk gum of all, the next is that of aluminium soap, and that of copper soap comes the third.

VI. The mass of copper soap and silk gum, which is precipitated by adding the sulphate of copper into the boiling-off liquor, and separated through filteration, can be elmulsified by the treatment with such emulsifiers as Turkey-red oil, gum arabic, potassium soap etc.. The emulsified copper soap is very good fungicide and has a great demand from gardners and pomologists. The method has been patented for the author. (Japanese Patent No. 65055)

VII. The mass of metallic soap and silk gum thus obtained is mixed with a small quantity of water and strong acid such as hydrochloric acid or sulphuric acid, the mixture of fatty acid and silk gum separates and collects on the surface of the aqueous liquid, and it can be easily skimmed off. The fatty matter can be separated from the sericine by the special steam distillation method, invented by the author, which enables the distillation at by far the lower temperature than the usual method. In this special distillation method, the author uses not only the vapour of the steam, but also utilizes that of the toluene, xylene, or other solvents immiscible to water and having lower boiling points than those of the fatty acids. By this process the distillation temp. of the fatty acid can be depressed about 30—50°C than those of the original ones.

ON THE SCROOP OF THE NATURAL SILK AND THE WAY TO PRODUCE IT ON THE RAYON (ARTIFICIAL SILK)

By Risaku Tsunokae.

(Received March 13th., 1926)

Preface

When the scoured silk fibre is squeezed or pressed it makes a crackling sound which is termed as "Scroop."

Several explanations to account for the scroop have been given, and these can be classified into two groups : the one is that the scroop of the silk is an inherent property of the fibre itself and it is produced by the scouring of it. But if the silk is badly treated in the course of degumming and aftertreatments, the scroop will be lost, but it may acquire again when it is worked in a bath of dilute acids. The other explanation is that the scroop of silk is not the original property of its fibre but an acquired one in the boiling–off operation and other aftertreatments.

On artifcial silks it is generally supposed that the scroop can not be produced on its fibre, but some writer says it can be done by passing the fibre through a soap bath at first and then through a bath containing a small quantity of acid, and drying it without further washing. According to the author's investigations, the crackling sound which can be termed generally as "Scroop" is not the inherent property of the natural silk fibre, but it is a character acquired in the course of scouring and aftertreatments. Moreover, if the conditions which are necessary for producing a "Scroop" on the fibre of natural silk are applied to the fibre of artificial silk, there can be produced on its fibre as good a scroop as that of the fibre of natural silk, and the author's method of producing the scroop on the fibre of artificial silk has been patented for him. (Japanese patent. No. 65671). The same method can be applied on the fibres of spun silk and cotton also.

The author read a paper in the Annual Meeting of the Agricultural Chemical Society of Japan held in April, 1925, on some parts of this investigation, the principal part of which appeared in the Journal of the Dainippon Sanshikaiho (Vol. 34. No. 401. 1925). Adding the recent experimental results, the author read another paper on this investigation in the Meeting of the Agricultural Chemical Society of Japan, held in January 1926. Here the auther wishes to put down the chief points form this last paper.

Experimental.

1. When the natural silks are scoured by means of alkali, or proteolytic ferment (enzyme) snch as pancreatin, or by the hot water under pressure in the autoclave without using marseilles soaps in each case, the "Scroop" is produced to some extent on their fibres, so it can be deduced that the silk fibre has the scroop of some degree as the inherent property of the fibre itself. By treating these scoured silks of different methods of scouring, with diluted acids such as acetic, tartaric etc., the scroops are increased in a degree. But compared with the scroops which is produced on the silk fibre scoured by the soap and after treated with the dilute acid, they are by far the less than those of the latter. In other words, the scoured silk fibre by means of the soap has the peculiar property for producing scroops on its fibre.

2. The scoured silk by means of soap absorbs always fatty acids and soaps on its fibre to the extent of about 1.2% of the weight of the silk. These residual substances in the fibre differ in quantity according to the aftertreatments of scouring process, that is, if the silk is treated by the soda solution, the quantity of the soap increases and that of the fatty acid decreases. On the other hand if the silk is passed through the acid bath at the end of the scouring process, the quantity of the fatty acid increases greatly and makes up more than 95% of the total residual substances. Such silks are always endowed with a good scroop on the fibre.

3. Reversely if the silk, scoured by means of diluted alkali instead of marseilles soap, is treated in the alcoholic solution of fatty acids and next in the diluted acid baths such as acetic, tartaric etc., the scroop can be produced on its fibre as good as that of the silk scoured by the soap. It is evident from these results that the necessary condition for producing the scroop on the silk fibre is the existence of fatty acid in the fibre and the after-treatment of the silk with acid.

4. The scroops produced on the silk fibre by the saturated fatty acids and acetic are rough and greater than those produced by the unsaturated fatty acids and acetic, but the latter is desirable for the natural silk fibre. Among some of the saturated fatty acids, lauric and myristic acids are preferable than stearic and palmitic acids in this respect.

5. A degree of scroop is also greatly influenced by the state of dryness of the material. When the sample is in the perfect dried state after the completion of the scouring operation, it produces the scroop better than that of the less dried samples. But the method of drying, whether it be a steam bath or a vacuum desicator does not matter.

6. There is no relation between the crystalization of fatty acids and their scroop producing power on the fibre.

7. As in the case of the natural silk, the scroop can be produced on the "Rayon" by the treatment with fatty acid solution and the aftertreatment with diluted acids. Unlike that of the natural silk, the saturated fatty acids are better fitted than unsaturated ones in producing scroop on the Rayon (artificial silks).

8. The method of producing "scroop" on the Rayon, which consists in the trearment of the Rayon with fatty acid solution and the aftertreatment with diluted acids, has been patented for the author. But the use of the solution of fatty acids in organic solvents being too expensive, the author recommends now the use of fatty acid as ammonium salts in an aqueous solution.

9. The Rayon thread composed with the fibre of smaller denier, will produce better scroop than that of the greater denier.

10. In order to know the influeuce of the acid used in the aftertreatment upon the fibres of natural and artificial silks, the author examined the stiffness of the fibre by "Serigraph" tests. (Serigraph invented by Dr. K. Hagiwara and K. Tanahashi is used for testing Elasticity of the silk fibre) The Stiffness of the scoured silk fibre decreases by the adsorption of fatty acids in it, while the silk fiber having no fatty acids in it increases its stiffness by the treatment of diluted acid, and the scroop is produced to some extent on the sample. The scoured silk treated with dilute acid in the presence of fatty acids in the fibre, increases its stiffness compared with that of the fibre with fatty acids in it and treated by the acid, but the scroop of the former sample is produced the best of all.

From these experimental results the author concluded that the scroop of the silk fibre is produced by the treatment of it with dilute acid in presence of fatty acids in the fibre.

RESEARCH ON REDUCTION POTENTIALS OF ORGANIC COMPOUNDS

(PART I)

REDUCTION POTENTIAL OF ISOVALERALDEHYE

By Masuzo Shikata and Isamu Tachi

Introduction

Applicability of the dropping mercury cathode for a research on reduction potentials of organic compounds has been proved by one of the present authors by the measurement of R. P. of nitrobenzene.*

The facilities of applying mercury dropping cathode, as it has been already proved, consist in the simplicity of its manipulation and the possibility of measurng minute quantities of reducible substances, for example in case of nitrobenzene the R. P. is determinable in a solution so dilute as to contain 10^{-5}mol of it.

The present authors observed, that some reducible substances were detected in the aqueous solution of Kahlbaum's isoamylalcohol.

The present work, as one of the systematic researches on the reduction potentials of organic compounds, has been undertaken in order to show the possible application of dropping mercury cathode to the qualitative and quantitative analysis of aldehyde.

The possible reducible impurities present in isoamylalcohol are lower aliphatic aldehydes, furfural and pyridine.

In the present report the measurement of R. P. of isoveleraldehyde by the mercury dropping cathode and its relations to the impurities of isoamylalcohol are chiefly described.

Experimental

The experiments have been carried out with the dropping mercury cathode and "Polarograph".×

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*M. Shikata : Trans. Faraday Soc. No. 61 Vol XXI p.42—62 (1925)

×Y. Heyrovský and M. Shikata : Rec. Trav. Chim. des Pays—Bas Tome XLIV(1925)p. 496—498.

The polarograph is a photographic auto–registering apparatus for tracing electrolysing current–voltage curves and has been very much used in the study of deposition potentials of metallic·ions to the mercury dropping cathode[**]

For the determination of R. Ps from the current–voltage curve the deposition of turning point of a constant current increment (i. e. 1,9. 10^{-8}amp per 10 mv) has been taken.

The isovaleraldehyde (Kahlbaum) has been purified by the bisulphite method and the fraction between 91° and 92°C has been taken. As the purified and unpurified Kahlbaum's isoveleraldehyde have shown no recognizable difference in the measuremeants, the latter has been used in the most part of those experiments.

In order to remove the atomospheric oxygen, hydrogen gas has been bubbled through the electrolysing vessel. A care has been given to avoid the evaporation of isovaleraldehyde of electrolysing solution, hydrogen gas has been passed through the wash bottle containing the isovaleraldehyde solution of the same composition as the electrolysing solution.

R. P.s have been measured in acidic, neutral as well as alkaline solutions with various concentrations of isovaleraldehyde. Anode potentials (i. e. anode corrections) have been calculated from a normal calomel electrode.

Table I

R. P. s in acidic solutions

Solu—tion	Conc. of isovaler-aldehyde (mol)	Anode potential	R. P. (observed) in volt	R. P. (calc. by formula (2)	π (ob)—π (calc)	R. P. (calc. by formula (3)	π——π (ob) (calc)
0.1n HCl	$1.868.10^{-1}$	+0.051	−1.098	standerd	0.000	standerd	0.000
〃	$9.34\ .10^{-2}$	+0.082	—1.111 (mean)	−1.106	−0.005	−1.104	−0.007
〃	$1.868.10^{-2}$	+0.052	−1.119	−1.127	+0.008	−1.119	0.000
0.01n HCl	$1.868.10^{-1}$	+0.091	−1.125	−1.156	+0.030	−1.127	+0.002
〃	〃 $.10^{-2}$	+0.096	−1.146	−1.185	+0.039	−1.177	+0.029
0.001n HCl + 0.1n KCl	〃 $.10^{-2}$	+0.070	−1.199	−1.243	+0.044	−1.235	+0.036

Table II

R. P. s in neutral solutions

Solution	Conc. of isovaler-aldehyde (mol)	Anode potential in volt	R. P. (observed) in volt	R. P (calc. by formula (2) in volt	π——π (ob) (calc)
3n NaCl	$9.34.10^{-2}$	−0.060	−1.260	−1.441	+0.181
1n 〃	〃	+0.005	−1.261	〃	+0.180
0.1n〃	〃	+0.042	−1.258	〃	+0.183
3n KCl	〃	−0.065	−1.292	〃	+0.149
1n 〃	〃	−0.003	−1.294	〃	+0.147
0.1n〃	〃	+0.045	−1.298	〃	+0.143

〃 〃	$1.868.10^{-1}$	$+0.066$	-1.255	-1.433	$+0.178$
〃 〃	$1.868.10^{-2}$	$+0.064$.	-1.353	-1.462	$+0.109$
〃 〃	〃	〃	-1.357	〃	$+0.105$

Table III

R. P.s in 0.1n NH_4Cl

(mean value of 2—3 times)

Conc. of isovaler aldehyde	Anode potential in volt	R. P. (observed) in volt	R. P. (calc. by formula (2))	π——π (ob) (calc)	R. P. (calc. by formula (3))	π——π (ob) (calc)	Height of saturation curve in Ampere
$1.868.10^{-1}$	$+0.050$	-1.258	-1.295	$+0.037$	-1.267	$+0.009$	——
〃 $.10^{-2}$	$+0.059$	-1.364	-1.324	-0.040	-1.401	$+0.037$	——
〃 $.10^{-3}$	$+0.058$	-1.553	-1.353	-0.200	-1.517	-0.034	$8.1.10^{-6}$
〃 $.10^{-4}$	$+0.060$	-1.596	-1.382	-0.214	-1.613	$+0.017$	$7.5.10^{-7}$
$9.34\ .10^{-5}$	$+0.060$	+?	——	——	——	——	——

Further the R. P. s in 0.1 n NH_4Cl solutions with various contents of isovaleraldehyde has been measured to see the shifts of R. P. s with concentrations of isovaleraldehyde and the form of saturation curves due to isovaleraldehyde.

Table IV

R. P. s in 0.1n NH_4Cl

(mean value of 2 — 3 experiments)

Conc. of isovaler aldehye	Anode potential in volt	R. P. (observed) in volt	R. P. (calc. by formula (2))	π——π (ob) (calc)	R. P. (calc. by formula (3))	π——π (ob) (calc)	Height of saturation curve in Ampere
$1.868.10^{-1}$	$+0.050$	-1.258	-1.295	$+0.037$	$-1\ 267$	$+0.009$	——
〃 $.10^{-2}$	$+0.059$	-1.364	-1.324	-0.040	-1.401	$+0.037$	——
〃 $.10^{-3}$	$+0.058$	-1.553	-1.353	-0.200	-1.517	-0.034	$8.1\ 10^{-6}$
〃 $.10^{-4}$	$+0.060$	-1.596	-1.382	-0.214	-1.613	$+0.017$	$7.5.10^{-7}$
$9.34.10^{-5}$	$+0.060$	+ ?	——	——	——	——	——

General Considerations of the Results.

Reduction of isovaleraldehyde can be considered as follows:

$$R.\ CHO + 2H = RCH_2OH$$

If the electrolytic reductions of isovaleraldehyde should proceed in an equilibrium state at the dropping mercury cathodes the R. P.s of isovaler aldehyde solutions should be given by the following formula:

$$\pi = -\frac{RT}{2F} \ln \frac{k''\ C_{R.CH_2OH}}{[H^{\cdot}]^2\ C_{R.CHO}} \qquad (1)$$

in which $C_{R.CHO}$ denotes the concentration of isovaleraldehyde and $C_{R.CH_2OH}$ that of isoamylalcohol. It has been previously proved that the primary

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**) See for example Rec. Trav. Chim. des Pays—Bas. Tome XLIV(1925) P. 499—607.

reduction of nitrobenzene at the mercury cathode proceeds in the equilibrium state.

Moreover, if we determine the reduction potentials of isovaleraldehyde, by taking the same current increment ($1,9.10^{-8}$amp.), $C_{R.CH_2OH}$ i.e.the concentration of reduced product is constant at the R. P.

So that we obtain for 20°C

$$\pi = -\frac{0.05812}{2} \log \frac{k}{[H^{\cdot}]^2 C_{R.CHO}} \qquad (2)$$

If we take the R. P. (i. e. at the point of current increment of $1,9 \; 10^{-8}$ amp) of 0,1n HCl solution, containing 0,1868 gr. mol per liter as standard (R. P. −1,098 volt), we can calculate the value of k

$\log K = 34,6724$

In an acidic and alkaline solution the formula (2) holds good to not an unsatisfactory degree; only in a neutral solution R. P. being much positive than expected from formula (2), that is to say, isovaleraldehyde is reduced much easier in a neutral solution than expected from the formula.

If we compare the R. P.s of the same hydroion concentration with various contents of isovaleraldehyde, we can obtain from the shifts of R. P., the coefficient of adsorption isotherm, by the formula proposed by one of us:***

$$\pi = -\frac{RT}{2F} \ln \frac{k}{C_{R.CHO}^{\frac{1}{m}}} \qquad (3)$$

For an acidic solution m=1,38, for an alkaline solution m=1.33, revealing some positive absorption of isovaleraldehyde to the mercury cathode in a slightly acidic solution as well as in a neutral solution m is smaller than one. For example in 0,1n NH_4Cl m=0,272, and in 0,1n KCl m=0,287.

It seems to be rather peculiar that m happens to be smaller than one, for such examples have rarely been met with until now. That m is smaller than one means passivity of hydroion discharge of desorption of isovaleraldehyde from mercury surface. This is quite probable, if we remind that nitrobenzene is under ordinary conditions highly absorbed by mercury surface, only when mercury is negatively polarised, the negative charge arising from the negative charge arising from the negative polarisation expels nitrobenzene from the mercury surface, namely the desorption of nitrobenzene occurs.

***) l. c. Trans. Faraday Soc. p52

If such desorption should occur in the case of isovaleraldehyde we can expect that the isovaleraldehyde would not be much influenced by the salting out action of a concentrated neutral solution.

In this respect nitrobenzene under ordinary conditions is much influenced by the salting action of neutral salt, which is revealed by its aquiring much positive reduction potential.

Contrary to nitrobenzene, the isovaleraldehyde solution shows no conspicuous change of R. P. in a highly concentratcd neutral salt solution, therefore it seems to be that the desorption must have taken place in this case. Although this is not the only explanation, the present authors are much inclined to take this view.

The height of saturation curve could be applied for the quantitative measurement of isovaleraldehyde. By this means the solubility of isovaleraldehyde in an aqueous solution is estimated to be 0.4475 gr.mol per liter. Further, by this method three reducible substances have been traced in isoamylalcohol of Kahlbaum's preparation. The most probable impurities of isoamylalcohol are aliphatic aldehydes, pyridine and furfural; so the reduction potentials of furfural, pyridine, isovaleraldehyde and isobutylaldehyde have been measured in a neutral as well as in 0.1n NH_4Cl.

Table V

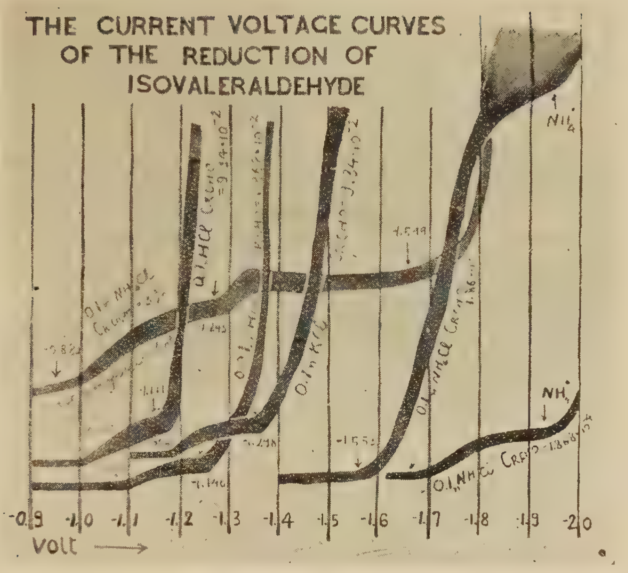
	Concentration	Solution		Reduction Potential			
				I	II	III	IV
Isoamylalcohol (KAHLBAUM)	3 %	0.1n	NH_4Cl	−0.880	−1.243	−1.599	——
Commercial Isoamylalcohol	0.1%	0.1n	KCl	−1.060	−1.263	−1.438	——
″ (distilled)	1 %	0.1n	NH_4Cl	−0.888	?	−1.559	——
Isovaleraldehyde	$1.868.10^{-3}$m		″	——	——	−1.553	——
Furfural	0.002%		″	——	−1.239	——	——
Isobutylaldehyde	1 %		″	−1.056	——	——	——
Pyridine	0.1251 m		″	——	——	——	−1.673

It will be seen that R. P. of the second and third reducible impurities coinside with those of furfural and isovaleraldehyde.

In the following diagram, the current voltage curve of isoamylalcohol as well asthose of isovaleraldehyde solutions are shown.

As regards to the Schiff's reagent for the aldehyde test, the limit of detectable concentration is $1.87.10^{-3}$ mol of isovaleraldehyde, whereas by the mercury dropping cathode isovaleraldehyde of $9.34\ 10^{-5}$ mol is detectable i.e. the latter method exceeds twenty times in sensitiveness.

Lastly to give a decisive proof that the reduction product is isoamylalcohol, the influence of isoamylalcohol has been studied and found that the R. P.



of isovaleraldehyde with a definite quantity of isoamylalcohol follows the formula (1) in the first approximation with respect to a system isovaleraldehyde –isoamylalcohol.

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A NEW METHOD OF COLORIMETRIC ESTIMATION OF HISTIDINE

PART I.

By Kôzô Suzuki and Yoshio Kaishio

(Received Apr. 11th., 1926)

(From the Chemical Laboratory of Imperial Zootechnical Experiment Station, Chiba.)

When the histidine solution is added to the solution of diazobenzene sulfonic acid in 10% solution of sodium carbonate, dark red colour is produced (diazo reaction), then the solution is made distinctly acid with strong hydrochloric acid, dark red colour becomes orange, now add zinc dust and allow the reduction to proceed for about 15 minutes. Render the clear, colourless, supernatant solution alkaline by the addition of strong ammonia. A characteristic golden yellow colouration is produced.

This reaction is known as Totani's reaction for histidine.

We attempted to estimate the amount of histidine colorimetrically by its golden yellow colour of Totani's reaction for histidine and it was ascertained that this reaction can be applied satisfactorily for the estimation of the small quantity of histidine by the following reasons:

1. Totani's reaction produces a characteristic golden yellow colour and the reactian is sensitive.

2. The golden yellow colour of histidine is permanent for a considerable time.

3. Totani's reaction is not affected by the excess of reagents such as sodium carbonate, conc. snlfuric acid, zinc dust and alkalies.

4 The intensity of the golden yellow colour is quite proportional to the amount of histidine.

We have found that a very dilute solution of potassium bichromate is same colour with the golden yellow colour, which is produced by Totani's reaction for histidine and it is convenient to use 1/100 normal solution of potassium bichromate for the standard.

There exists following relation between 1/100 normal solution of potassium bichromate and the amount of histidine:

1 mm. layer of $K_2Cr_2O_7$=0.010932 mg. nitrogen of histidine in 1 cc.

The computation of the unknown amount of histidine can be readily made by means of the following equation:

$$X = \frac{0.010932 \times d}{D}$$

X mg. of histidine nitrogen in 1 cc.

D number of mm. of the histidine solution.

d number of mm. of 1/100 normal $K_2Cr_2O_7$ solution.

By the application of this colorimetric estimation method of histidine, hexon bases of the decomposition products of proteins can be calculated asfollows:

Arginine N=4/3 (total base N−amino N−2/3histidine N)

Lysine N=total N−(histidine N+arginine N+cystine N)

ON SULPHUR CONTAINING AMINO-ACIDS. VI.

ON THE PRESENCE OF CYSTEINE GROUP IN PROTEIN MOLECULES.

By Yuzuru Okuda and Yuraku Nishijima.

(Received Apr. 11 th., 1926)

(From the Biochemical Laboratory, Department of Agriculture,
Kyushu Imperial University, Fukuoka.)

The purpose of this investigation was to make some quantitative studies concerning the presence of cysteine group in the protein molecule, a subject on which, as far as we know, no work has hitherto been done.

The summary and conclusion of the investigation were as follows:

(1). The authors have failed to confirm the findings of Mörner that cysteine is produced secondarily from cystine during prolonged hydrolysis of proteins with hydrochloric acid.

(2). The authors have demonstrated that the procedure of Mörner for the identification of cysteine in a protein–hydrolysate is erroneous, and have verified the fact that cysteine is not produced from cystine, but that on the contrary cysteine, in the course of hydrolysis, gives rise to cystine, and that both cysteine and cystine are the primary products of the complete hydrolysis.

(3). In accordance with the results of investigation of Heffter and Arnold, the authors have found that some proteins give the nitroprusside reaction while others do not, and came to the conclusion that there are sulphur-linkages, such as R–SH, R–S–R and R–S–S–R, in protein molecules. The protein containing R–SH group gives the reaction directly, the one containing R–S–R group indirectly or after a certain degree of hydrolysis, and the other containing R–S–R alone does not.

(4). Cysteine and cystine were determined, by means of the iodine-method, in the several stages of hydrolysis of proteins. Egg albumine and wool gave only a minute quantity of cysteine in comparison with that of cystine but muscle–proteins freshly prepard gave much cysteine, for instance, the muscle protein of Pagrus, when hydrolysed with hydrochloric acid in the current of carbon dioxide gas, gave nearly an equal amount of cysteine and cystine. When it is borne in mind that cysteine is easily oxidizable to cystine, during the preparation of proteins, and especially in the instant of the cleavage of proteins, the cysteine content of living muscle proteins should be predominate to their cystine content.

(5). The effect of acid hydrolysis upon cysteine was studied with pure cysteine and with a mixture of cysteine and gelatine which contained no cysteine. The hydrolysis was performed in the usual way or in the air. The quantity of preformed cysteine and cystine produced were determined quattitatively. The oxidation was slow and the cysteine reaction disappeared after about 100 hours of hydrolysis but when muscle proteins containing the cysteine group was treated in the same way the oxidation was more rapid, and after 20 hours the cysteine reaction was negative. From this experimental result we see that isolated cysteine is more stable than cysteine in the nascent state, which is reactive and autoxidizable.

(6). When cysteine was boiled with hydrochloric acid as mentioned above it became cystine quantitatively.

ON THE HORDEIN OF THE NAKED BARLEY.

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Three Kinds of Alcohol soluble proteins were separated by the authors from new and old naked barley(Hordeum Coeleste L.)according to Osborne's method.

(1) The old barley flour was extracted with 70% cold alcohol. The resulted solution was condensed to a small volume and cooled, when a jelly like substance was deposited.

Dissolving it in a little quantity of dilute alcohol, pouring into the cold water (0—5°), the protein was again deposited.

After this treatment was repeated three times it was redissolved in a small quantity of dilute alcohol when this solution was the absolute alcohol, a firm coagulum (A) was formed in the milky solution. By condencing the mother solution separated from (A) to a small volume and pouring into the cold water, it produced the second yield (B).

(2) From the new barley flour we obtained by the same method also two proteins (C) and (D).

But (B) and (D) were proved afterwards to be identical.

We studied these three proteins on their physicochemical and chemical properties and found the marked differences among them in the following points.

(1) The color reaction.

(2) The behaviours for water and alcohol.
(3) The turbidity in relation to concentration of alcohol and temperature.
(4) The surface tension of alkaline solution of these proteins.
(5) The elemental composition.
(6) The proportion of nitrogen.
(7) The ratio of total sulphur to sulphide sulphur.

From above results, we found that the alcohol soluble protein of naked barley was distinctly different from hordein which was described by Osborne in 1895 and by others,

	Hordein of Common Barley.	Hordein of Naked Barley.
(1)	Homogenous substance	Not homogenous, but probably mixture in most occasion.
(2)	With sulphuric acid it gives red color.	Purple red–red

(3) Elemental compositon

		C	A	B
C	54.29	56.16	55.97	54.72
H	6.80	6.65	6.64	6.50
N	18.21	17.15	16.36	15.18
S	0.83	0.19	0.33	0.63
O	20.87	19.85	20.70	22.97

(4) Distribution of nitrogen.

Total	N	17.21	17.15	16.36	15.18
Amide	N	4.10	4.00	3.03	2.00
Humine	N	0.23	0.31	0.22	0.22
Diamino	N	0·77	3.01	2.70	2.24
Mono-amino	NN	12.20	9.83	10.41	10.72

Percentage for total nitrogen.

Total	N	100.00	100.00	100.00	100 00
Amide	N	23.00	23.32	18.52	13.17
Humine	N	1.70	1.81	1.34	1.45
Diamino	N	7.69	17.56	16.50	14.75
Mono-amino	N	67.61	57.31	63.64	70.63

But a further research will be required to establish the difference more clearly.

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